

F-K Domain Analysis (3A)

Copyright (c) 2011 Young W. Lim.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

Please send corrections (or suggestions) to youngwlim@hotmail.com.

This document was produced by using OpenOffice and Octave.

2D FT seismic example

24 receivers each with 25m spacing

Time Shift 15 ms/trace

Seismogram Total Length 1sec

Sampling Period 0.001 sec $f_s = 1000 \text{ samples/sec}$

Narrow band signal's frequency 12 Hz

Phase Velocity?

$$15 \text{ ms/trace} * 23 \text{ trace} = 345 \text{ ms} = 0.345 \text{ sec}$$

$$12 \text{ Hz} \quad \Rightarrow \quad 12 \text{ cycles / sec} * 0.345 \text{ s} = 4.14 \text{ cycles}$$

$$25\text{m spacing} \quad \Rightarrow \quad 25\text{m} * 23 = 575 \text{ m} = 0.575 \text{ km}$$

$$k = \frac{4.14 \text{ cycles}}{0.575 \text{ km}}$$

$$k = \frac{2\pi}{\lambda}$$

2D FT seismic example

24 receivers each with 25m spacing

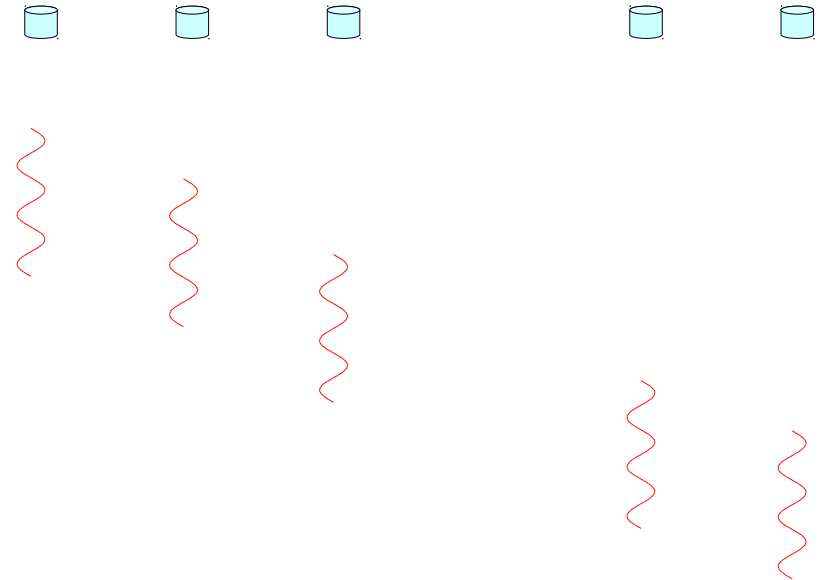
Time Shift 15 ms/trace

Seismogram Total Length 1sec

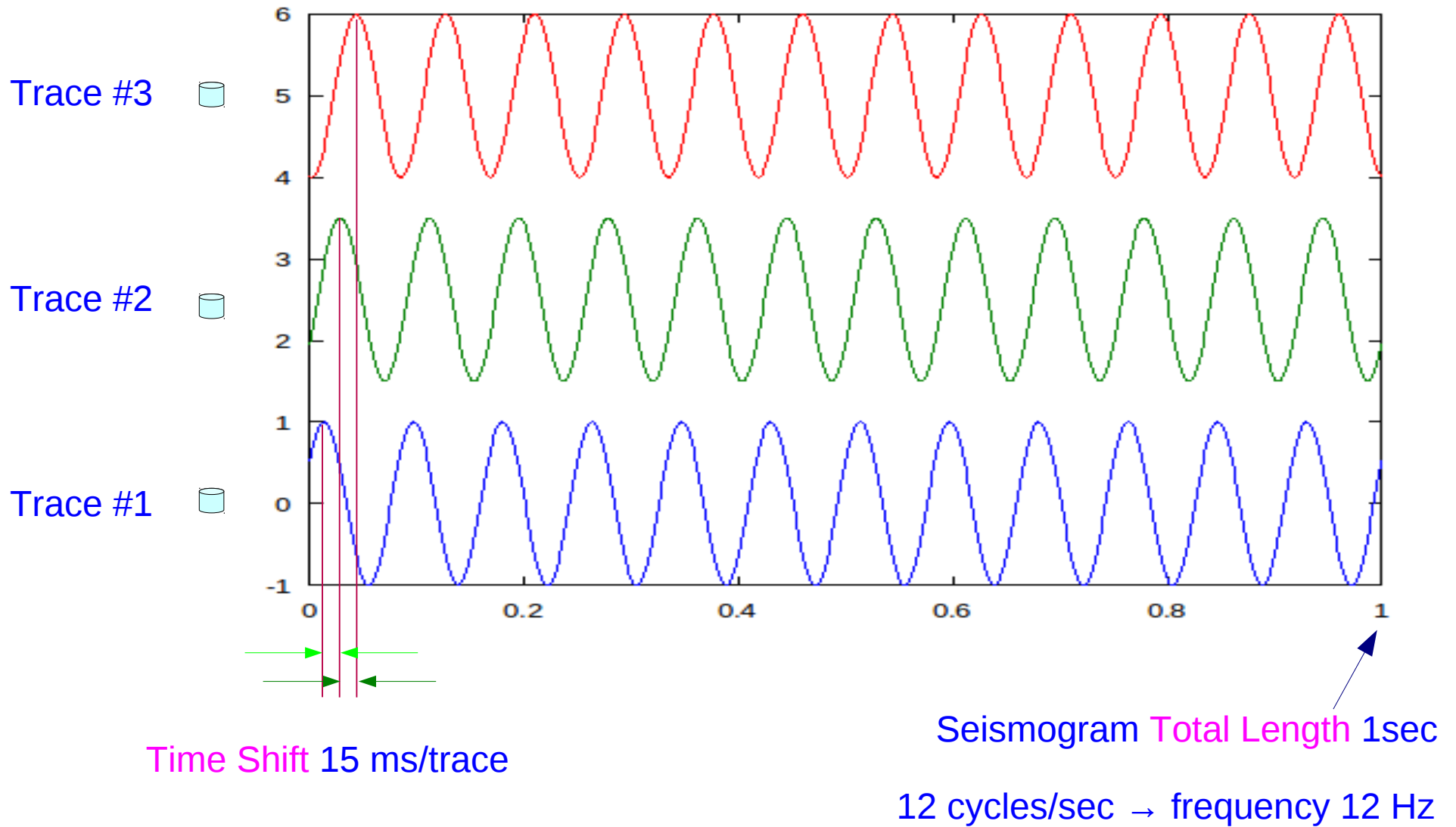
Sampling Period 0.001 sec

$$f_s = 1000 \text{ samples/sec}$$

Narrow band signal's frequency 12 Hz

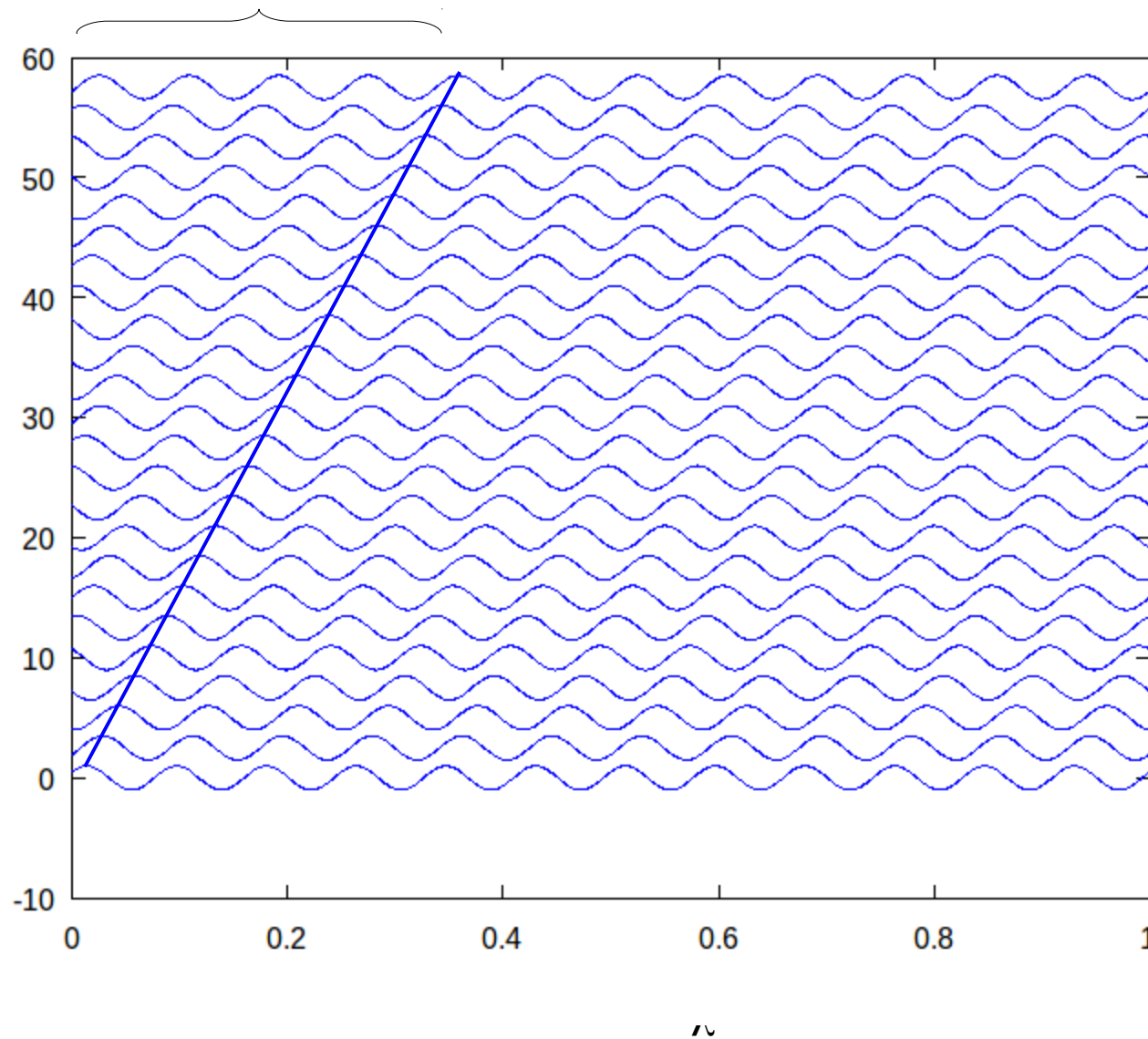


2D FT seismic example



2D FT seismic example

$$k = \frac{4.14 \text{ cycles}}{0.575 \text{ km}}$$



References

- [1] <http://en.wikipedia.org/>
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
- [3] <http://www.mathpages.com/>, Phase, Group, and Signal Velocity
- [4] R. Barlow, www.hep.man.ac.uk/u/roger/PHYS10302/lecture15.pdf
- [5] P. Hofmann, www.philiphofmann.net/book_material/notes/groupphasevelocity.pdf
- [6] <http://www.ualberta.ca/~ygu/courses/geoph426/>